SECURES: Securing Austria's electricity supply in times of climate change – overview on scenario design and modelling assumptions

Energiesystem- und Klimamodellierung
Demet Suna[1](1), Gustav Resch (2), Franziska Schöniger (2), Nicolas Pardo-Garcia (1), Florian Hasengst(2), Gerhard Totschnig (1)
(1) AIT Austrian Institute of Technology GmbH, Integrated Energy Systems,
(2) TU Wien Energy Economics Group

Motivation and Core Objectives

The transition of Austria's electricity system towards a safe and sustainable future in times of climate change brings a broad range of challenges and opportunities into the policy debate where timely decisions on the way forward are of key relevance. To provide targeted support to Austrian policy makers for Austria´s future years, the project SECURES aims

- to define a suitable set of future trend scenarios for electricity sector and
- to conduct a comprehensive model-based scenario analysis of Austria's future electricity sector, targeted to secure a reliable, sustainable and cost-efficient transition of Austria's electricity sector in times of climate change.

This work elaborates assumptions made for the related scenario development process and is intended to be part of the special session on the project SECURES within IEWT 2023.

Methodology

The modelling system covers Austria but also other European countries to represent cross-border exchange within the electricity sector. The main aspect of scenario design is the combination of energy transition pathways for 2030 and 2050 with proper climate change scenarios, formed from climate change simulations in accordance with Representative Concentrated Pathways (RCP). Based on a literature survey and an in-depth stakeholder consultation process, two distinct energy transformation scenario pathways have been defined: A Reference (REF) and a Decarbonisation Needs (DN) scenario. Below we inform on the outcomes of that process, the exact scenario definition and the further analytical process within the SECURES project.

Results and Conclusions

For REF scenario Austrian and EU-wide existing measures and goals including 2030 emissions targets are considered as identified in the National Trends scenario of ENTSOe-TYNDP2022 [1]. It relies on the 100% RES-based electricity system for Austria by 2030 (national balance sheet), however represents less decarbonization ambition in other sectors and EU countries, and accordingly expected to match with a strong climate change scenario (RCP 8.5).
On the contrary, the DN-scenario represents a strong decarbonation ambition across the whole EU based on [2] and is coupled with a moderate climate change scenario (RCP 4.5). Here the measures are considered to achieve full decarbonization by 2050 that implies a strong sector-coupling and decarbonization of other sectors such as industry and mobility.
Since the overall assessment focuses on supply security for both scenarios described above a Security of Supply (SOS) variant is analyzed as well, assuming extreme weather conditions (e.g. cold and heat waves) in accordance with climate data coupled with conservative assumptions for critical system bottlenecks. Both scenarios build on the detailed analysis of future demand trends, reflecting climate change impacts, consider future grid developments based on [1] and incorporate all relevant flexibility options.

Funding

The project SECURES is funded by the Climate and Energy Fund (Klima- und Energiefonds) under project number KR19AC0K17532.

[1] 1210 Wien, Giefinggasse 6, +43 664 2351944, demet.suna@ait.ac.at, https://www.ait.ac.at/

References

[1] E. and ENTSO-E, ‘TYNDP 2022 Scenario Report: Download’, Sep. 28, 2021. https://2022.entsos-tyndp-scenarios.eu/download/ (accessed Nov. 21, 2022).

[2] G. Resch *et al.*, ‘Technical Report on the Modelling of RES auctions –Key insigth on the model-based analyses’, p. 77, Jun. 2022.